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Comparative study of calcium and potassium in stress secretion of freshwater snail *Bellamya bengalensis* (Jousseau, 1886) with reference to body size.

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Abstract : Edible snail *Bellamya bengalensis* has potential nutritional as well as medicinal importance. In present work the concentration of total calcium and potassium has been analysed in stress secretion of *B. bengalensis* of different shell size (1-2cm and 2-3.5cm). The investigation results have shown that the concentration of the calcium and potassium in larger size snail (2-3.5cm) was 15.93 ± 0.66 mg/dl and 0.57 ± 0.04 mmol/L and in smaller size snail (1-2cm) was 15.63 ± 0.72 mg/dl and 0.48 ± 0.075 mmol/L respectively in the secretion of snails. Statistical analysis were done by using student's t-test, it revealed that the difference obtained in small and large size snail for Ca^{++} concentration was not significant ($p > 0.05$) and in K^{+} ion concentration was significantly higher in larger snail group at 0.1% level ($p < 0.001$).

Keywords : *Bellamya bengalensis*, Snail stress secretion, Ca^{++} , K^{+} , Student's t – test.

INTRODUCTION

Snail *B. bengalensis* is abundantly found in all types of temporary and permanent water bodies of Jharkhand. Many people belonging under different economic classes of tribal community consume *B. bengalensis* as their food intake for not only its cheap rate and better taste but also its great nutritional as well as its medicinal value. Especially people suffering with anaemia, malformation of bone structure, treatment of eye problems, consume its meat and soup with belief to restore their health.

People strongly believe about the function of *B. bengalensis* which can cure several diseases such as controlling conjunctivitis, night blindness, diarrhoea, stomach disorder, arthritis, joint pain, rheumatism cardiac diseases controlling blood pressure, asthma, rickets

(calcium metabolism) nervousness and giddiness etc. Annandale.N. *et al*¹ and Sewell *et al*², studied the ecology and growth rate of snail. Recently Ethnomedicinal importance of *B. bengalensis* was estimated in terms of analysis of its protein and amino acid composition by Debojit. *et al*³ and they also studied proximate fatty acid composition of *B. bengalensis*. The secretions secreted by snails have powerful antioxidants which protect them from oxygen radicals. Calcium ions are needed for blood clotting and successful functioning of nerves and muscles. The high content of calcium in the snail investigated, suggested that consumption of *B. bengalensis* can increase the calcium in the body and contribute tremendously to the blood clotting process. This may account for use of snail meat by in treating rickets by S. P. Roy *et al*⁴ and malformation of bone structure by Akinnusi. O.⁵ Potassium plays a role in every heartbeat. A hundred thousand times a day, it helps trigger our heart to squeeze blood through

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our body. It also helps our muscles to move our nerve to work, and our kidney to filter blood.

The bodies of snails are characterised by rich mucus which covers their surface. Apparently, the mucus may serve in preventing the moisture evaporation and it helps in smooth movements (Simkiss and Wilbur) ⁶. It also protects the body from mechanical injuries. Mucus and stress secretion have antibacterial properties against many pathogenic bacteria. In addition sum unknown biochemical functions may be involved in the stress secretion, though nothing has been reported so far in this respect. Snails are fairly resistant to infection by microorganisms. So, present studies have been done to estimate biochemical composition such as Ca⁺⁺ and K⁺ concentration of stress secretion between two sized snails.

MATERIALS & METHODS

Collection of Sample and extraction of secretion:

Snail *B. bengalensis* were purchased from Ranchi market and brought to P.G.Department of Zoology laboratory, and collected sample were kept in aquarium under laboratory condition. They were thoroughly cleaned with cleaned napkin to remove all the sand and debris on the shell.

The calcium content of secretion was done by OCPC kit method (Gitelman. H. J) ⁷. Potassium content by Ion-Selective Electrodes method (Moseby)⁸.

RESULT & DISCUSSION

Table1: Calcium concentration (mg/dL) of secretion in different size of *Bellamya bengalensis*.

Snail Size (cm)	Calcium concentration (g/dL)	Av. Concentration of calcium (g/dL)	Value of t-test
2-3.5	16.0	15.93±0.66	0.96
	15.0		
	16.1		
	15.4		
	16.3		
	17.0		
	16.8		
	15.7		
	15.0		
1-2	16.0	15.63±0.72	0.96
	16.2		
	15.3		
	15.0		
	14.5		
	14.7		
	16.0		
	15.8		
	16.8		
	16.0		

P>0.05, not significant.

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Table 2: Potassium concentration (mmol/L) of secretion in different size of *Bellamya bengalensis*.

Snail Size (cm)	Potassium concentration (mmol/L)	Av. Concentration of Potassium (mmol/L)	Value of t-test
2-3.5	0.60	0.57±0.04	5.62***
	0.50		
	0.60		
	0.55		
	0.63		
	0.50		
	0.63		
	0.58		
	0.60		
0.60			
1-2	0.50	0.48±0.075	
	0.50		
	0.60		
	0.50		
	0.48		
	0.50		
	0.55		
	0.60		
	0.60		
0.52			

***=P<0.001, Significant at 0.1%

Table 1, showed that both sized snail had nearly same calcium content (15.93±0.66 mg/dl and 15.63±0.72 mg/dl). When these values were statistically analysed with t-test no significant difference was observed (P>0.05). Table 2, showed that in larger size snail had more potassium concentration (0.57±0.04mmol/l) than smaller size snail (0.48±0.075mmol/l). When these values were statistically analysed it was observed that larger sized snail had significantly higher concentration of potassium at 0.1% level (P<0.001).

The result corroborates with the studies done by Lori L .*et.al*⁹, according to which hemolymph of bivalve *Elliptio complanata* content of Ca⁺⁺ 19.3 m g/dl, K⁺ 0.5.0 mmol/l. According to Smith *et .al.*¹⁰ in hemolymph of horseshoe crab calcium was (39.0mg/dl), potassium (12.5mEq/L). In freshwater crab *Spiralothelphusa*

hydroma Ca⁺⁺ and K⁺ content was 9.7%, 5.2% respectively (Varadharajan. *et. al*)¹¹.

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